

REMARKS

The Office Action was issued on pending claims 1-22 and 28-37. Claims 23-27 have been previously withdrawn from consideration. Claims 1-22 and 28-37 stand rejected. In this Response, claims 1, 15, 18, 19 and 28-31 have been amended, claims 38-53, and no claims have been cancelled. Thus, claims 1-22 and 28-53 are pending and under consideration, and claims 23-27 are withdrawn from consideration.

Examiner Interview

Applicant thanks the Examiner again for the courteous personnel interview. The Examiner is invited to call Applicant's representative to discuss any issues with the patent application.

Restriction Requirement

Office Action paragraph 1 refers to an election of claims 1-6, which is apparently a typographical error. Claims 1-22 and 28-33 were elected in response to the restriction requirement. Indeed, the Office Action was issued on claims 1-22 and 28-37 (claims 34-37 were added following the restriction requirement).

Claim Rejections

In Office Action paragraph 4, claims 1-12, 15-19, and 28-37 were rejected under 35 U.S.C. § 102(b) as being anticipated by Rex (US 4,250,136) as interpreted by the evidentiary document Starling et al. (US 6,210,715). In Office Action paragraph 6, claims 13 and 14 were rejected under 35 U.S.C. § 102(b) as being anticipated by or, in the alternative, under 35 U.S.C. § 103(a) as obvious over Rex. Applicant respectfully disagrees.

Independent claim 1 has been amended to clarify that the microsphere particles consist essentially of diameters ranging from about 1 micron to about 350 microns. Accordingly, Applicant's inventive composite material, as claimed in claim 1, includes a plurality of microsphere particles ranging from about 40% by volume to about 85% by volume in which the microspheres consist essentially of diameters ranging from about 1 micron to about 350 microns. The amendment to claim 1 is supported in the Specification at page 13, line 3.

Turning to Rex, Rex pertains to a method of forming a composite structure. The Rex composite structure includes a relatively thick syntactic foam core element 16. See Figs. 1 and 2 of Rex. As acknowledged in the Office Action, the syntactic foam core element 16 includes macro-spheres (large spheres). The macro-spheres have a significantly larger diameter in the range of between 500 and 15,000 microns compared to micro-spheres having a diameter of 10 to 200 or 300 microns. See Rex, column 4, lines 30-38; column 6, lines 42-54, and column 7, lines 46-47. See Applicant's Figs. 3-6 for examples of the significant difference in size of micro-spheres relative to a 500 micron reference line. Rex provides a preferred ratio of the volume amount of macro-spheres to micro-spheres of about 3 or 4 to 1. See Rex, column 7, lines 46-49. The Rex syntactic foam core includes about three or four times the volume amount of macro-spheres (500-15,000 microns) than micro-spheres (10-300 microns). Accordingly, Rex does not show or describe a composite material having a plurality of microsphere particles ranging from about 40% by volume to about 85% by volume of the composite material in which the microsphere particles consist essentially of diameters ranging from about 1 micron to about 350 microns. Rather, the Rex composite structure includes a substantial amount of macro-spheres (diameter range of between 500 and 15,000 microns) and a substantially lower amount of micro-spheres (diameter range of between 10-300 microns) instead of the claimed microsphere particles.

Applicant further respectfully submits that it would not be obvious to modify Rex to replace the 500-15,000 micron diameter macro-spheres with the significantly smaller 10-300 micron diameter micro-spheres. The Rex syntactic foam core includes two very different sizes of spheres, macro-spheres and micro-spheres. The spheres are merely considered to be fillers for the resin in the syntactic foam core and are used primarily to reduce density and lighten the cured resin. See Rex, column 6, lines 55-57. Rex primarily uses larger diameter macro-spheres because macro-spheres provide a larger filler volume than smaller diameter micro-spheres. Rex emphasizes the use of macro-spheres in the syntactic foam core by preferring about three or four times the volume of macro-spheres as micro-spheres. See Rex, column 7, lines 46-49. Rex provides significantly fewer micro-spheres in the syntactic foam core merely to fill the interstices between the macro-spheres to reduce the core density. The loading factor of micro-spheres is quite low at only about 20%-30%, which is the incremental loading factor above the macro-sphere loading factor of 50%-60%. See Rex, column 7, lines 9-18. Accordingly, Rex teaches a

syntactic foam core which includes a relatively high volume of macro-spheres (500-15,000 microns) and a relatively low volume of micro-spheres (10-300 microns). Modifying the Rex syntactic foam core to have only micro-spheres would be contrary to the teachings of Rex. Thus, it would not be obvious to one of ordinary skill in the art to modify the Rex syntactic foam core to include only micro-spheres without the macro-spheres.

Applicant respectfully submits that Starling et al. does not remedy the deficiencies of Rex. Starling et al. does describe microbeads having a broader range of diameters than Rex. However, merely because Starling et al. refers to microbeads in general as having a wider range of diameters does not provide a teaching, suggestion, or motivation to contradict the teachings of Rex by replacing the macro-spheres with micro-spheres in the Rex syntactic foam core.

As to the other claims in the present application, all independent claims have been amended to define the size range to be from about 1 micron to about 350 microns.

Thus, Applicant respectfully submits that the §102 and §103 rejections have been overcome.

New Claims

New claims 38-53 have been added. Claims 38-53 are supported by the application as originally filed. Accordingly, no new matter has been added. For example, see the Specification at page 13, line 2 for the range of from about 15 microns to about 120 microns. The Specification also includes various examples of Applicant's invention having a single, nominal diameter microsphere. The term "single, nominal" diameter or size in the claims is intended to be mainly a single diameter/size, yet allow for variation in diameter/size of the microparticles, for example, due to manufacturing processes. Commercially available microspheres of a "single, nominal" diameter may actually have a distribution of diameters, but, are focused toward a single diameter or average diameter.

Applicant submits that claims 38-53 are also allowable.

CONCLUSION

For the foregoing reasons, Applicant submits that the patent application is in condition for allowance and requests a Notice of Allowance be issued.

Respectfully submitted,

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